

IN THE CLAIMS:

Please amend the claims as follows:

1. (Currently Amended) A self regulating flexible heater construction for producing heat when connected to an electrical power source, comprising:
a flexible fabric substrate conformable to the shape of a contiguous flexible surface to be heated;
a layer of a positive temperature coefficient material; and
a layer of a conductive material, wherein at least one of the layers is applied to the heater in an interdigitated pattern.

2. (Original) The heater of claim 1 wherein the substrate is woven or non-woven fabric.

3. (Original) The heater of claim 1 wherein the layer of conductive material is applied to the layer of positive temperature coefficient material in an interdigitated pattern.

4. (Original) The heater of claim 1 wherein the layer of positive temperature coefficient material is applied to the layer of conductive material in an interdigitated pattern.

5. (Original) The heater of claim 1 wherein the density of the fabric is 1 to 6 ounces per square yard.

6. (Original) The heater of claim 1 wherein the PTC material is comprised of a polyolefin resin.

7. (Original) The heater of claim 1 wherein the coating of PTC material has a weight 7 to 20 lbs. per ream.

8. (Original) The heater of claim 1 wherein the positive temperature coefficient material has a surface resistivity of 2 to 10 kilo-ohms as measured by multimeter probes set 1 cm apart.

9. (Original) The heater of claim 1 wherein the positive temperature coefficient material has a surface resistivity of 3 to 8 kilo-ohms as measured by multimeter probes set 1 cm apart.

10. (Original) The heater of claim 1 wherein the conductive material is formulated from a mixture of a polymeric resin selected from the group consisting of vinyls, polyesters, acrylics and a conductive material selected from the group consisting of silver pigment, a silver coated copper pigment, or plated copper pigments.

11. (Original) The heater of claim 1 wherein the conductive material is formulated from a mixture of solvating materials selected from the group consisting of organic solvents and water based solvents and a conductive material selected from the group consisting of silver pigment, a silver coated pigment, or plated copper pigments.

12. (Original) The heater of claim 1 wherein the conductive material is constructed of conductive wires fixed within the construction by conductive glues.

13. (Currently Amended) A self regulating flexible heater construction for producing heat when connected to an electrical power source, comprising:

a flexible fabric substrate conformable to the shape of a contiguous flexible surface to be heated;

a layer of a positive temperature coefficient material; and

a layer of a conductive material, wherein at least the layer of conductive material is applied to the substrate by screen printing, spraying, draw down, web printing or any other printing method capable of providing a uniform coating.

14. (Currently Amended) A self regulating flexible heater construction for producing heat when connected to an electrical power source, comprising:

a flexible fabric substrate conformable to the shape of a contiguous flexible surface to be heated;

a layer of positive temperature coefficient material;

a layer of conductive material; and

a plurality of buss bars in electrical contact with the conductive material and an electrical power source.

15. (Original) The heater of claim 14 wherein the buss bars have a width dimension and a length dimension, and wherein the width decreases over at least a portion of its length.

16. (Original) The heater of claim 14 wherein the buss bars have a width dimension and a length dimension, and wherein the width remains constant over at least a portion of its length.

17. (Original) The heater of claim 14 wherein the buss bars have a width dimension and a length dimension, and at least one void at a preselected location along its length.

18. (Original) The heater of claim 14 wherein the buss bars have a width dimension and a length dimension, and wherein the width dimension increases step-wise over at least a portion of its length.

19. (Original) The heater of claim 14 wherein the spacing of the busses varies across the heater.

20. (Original) The heater of claim 1 further comprised of an overlayer of a laminated or sewn secondary breathable woven or non-woven fabric comprised of natural or synthetic fibers which covers the heater.

21. (Previously Amended) The heater of claim 20 wherein the overlayer is an encapsulating coating, which may be a flame retardant coating, which is applied over the heater.

22. (Original) The heater of claim 1 wherein the heater is incorporated within the construction of a seat for an automobile.

23. (Currently Amended) A self regulating flexible heater construction for producing heat when connected to an electrical power source, comprising:

DK

a flexible fabric substrate conformable to the shape of a contiguous flexible surface to be heated;

a layer of positive temperature coefficient material; and

a layer of conductive material, wherein the heater has a multiple buss design providing for high and low current settings, comprised of at least a common setting buss, a low setting buss, and a high setting buss, in which current flows from either the common setting buss to high setting buss or from the common setting buss to low setting buss.

24. (Currently Amended) A self regulating flexible heater construction for producing heat when connected to an electrical power source, comprising:

a flexible fabric substrate conformable to the shape of a contiguous flexible surface to be heated;

a layer of a positive temperature coefficient material; and

a layer of a conductive material, wherein the heater fabric construction has a bulk density of about 0.6 g/cm^3 or greater and a thermal diffusivity of about $0.003 \text{ cm}^2/\text{s}$ or greater.

REMARKS:

At the time of the Office Action, claims 1-24 were pending. Claims 1-24 stand rejected. Pursuant to this Amendment, claims 1, 13, 14, 23 and 24 have been amended. Claims 1-24 remain pending.

Claims 24 has been amended to address the objections raised by the Examiner under 35 U.S.C. 112. Removal of the rejection is respectfully requested.

Claims 1-2, 4-10, 12-21 and 24 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Watts (U.S. Patent 4,857,711) in view of Schmitt (U.S. Patent 4,399,347). Watts was cited for its disclosure of a self-regulating heater that has a MYLAR substrate onto which a layer of PTC material and a layer of conductive material are screen printed. Watts' heater is mounted on the back side of an automotive side-view mirror by adhesive layer 52 (col. 4, lines 54-60).

The Examiner acknowledges Watts lacks the claimed flexible fabric substrate and refers to Schmitt's disclosure of a woven or non-woven fabric substrate 7, which he proposes to substitute for Watts' MYLAR substrate. Fabric 7 is described by Schmitt "to impart directional stiffening ability to the planar structure" (col. 4, lines 13-15).

Schmitt discloses fabric layer 7 as having a continuous coating 3 of a binder on its front side with an aluminum powder embedded therein. The stated purpose for the support layer 7 is to provide stiffness to the planar structure 1 and provide reflectivity for incident heat rays. (Col. 4, lines 17-26).

The Examiner states that it would be obvious to one of ordinary skill in the art at the time the invention was made to substitute the Schmitt support fabric 7 for Watts' MYLAR substrate because Schmitt teaches fabric 7 serves to provide support or because Schmitt teaches fabric 7 provides an aesthetic quality. Neither of these two reasons supports the Examiner's proposed substitution. Since Watts' heater structure is mounted

on the back side of an automotive side-view mirror, there is no need to physically support the structure and certainly no need for adding an aesthetic quality to a substrate that would be hidden from view.

Furthermore, it is noted that the function and structure of the Watts and Schmitt heaters are so different to make the proposed substitution unobvious under 35 U.S.C. 103. Watts' heater functions by heating the mirror through conduction. Schmitt uses convection and radiation to heat the windshield surface which is physically spaced from the heater structure. It is submitted that there is no disclosure, suggestion or motivation found in either Watts or Schmitt that would support the proposed substitution of Schmitt's fabric 7 for Watts' MYLAR substrate.

To further patentably distinguish the rejected claims from the combination of Watts and Schmitt, independent claims 1, 13, 14, 23, and 24 have been amended to recite the flexible fabric substrate is conformable to the shape of a contiguous flexible surface to be heated. Neither Watts nor Schmitt, taken alone or in combination, disclose, suggest or motivate one skilled in the art to make a self-regulating heater construction with a flexible fabric substrate conformable to the shape of a contiguous flexible surface to be heated. Neither the mirror of Watts or the window of Schmitt represents a flexible surface to be heated.

Regarding the rejection of Claims 20-21, Applicant disagrees with the Examiner's assertion that Schmitt discloses a fabric overlayer that covers the heater (claim 20) or encapsulates the heater (claim 21). Applicant also disagrees with the Examiner's assertion that Schmitt teaches the addition of an overlayer for aesthetic quality and thus could be substituted in Watts'. Where is the motivation to give Watts' heater a decorative overlayer when the heater is disclosed as being installed inside a mirror housing?

Regarding the rejection of Claim 24, Schmitt teaches away from using a fabric construction having a bulk density of $0.6\text{g}/\text{cm}^3$ and a thermal diffusivity of about 0.003

cm²/s or greater. Schmitt uses fabric 7 to provide stiffness to the planar structure and would not change its characteristics to allow it to conform to the shape of a contiguous flexible surface to be heated.

For at least the foregoing reasons, claims 1-2, 4-10, 12-21 and 24 are patentable over the proposed combination of Watts and Schmitt.

Claim 22 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Watts in view of Schmitt and Gustavsson et al. (U.S. Patent 5,643,480). The arguments given above regarding the incorrectness in combining Watts and Schmitt apply with equal force to the rejection of Claim 22. Gustavsson is cited for disclosing a heater incorporated in an automotive seat structure. There is no disclosure, suggestion or motivation found in any of these references under the standards of 35 U.S.C. 103 to support the obviousness of combining a convection heater for a windshield surface with a conduction PTC heater for an automotive mirror and a PTC conduction heater for an automotive seat.

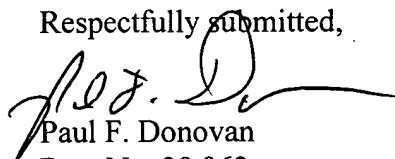
Claim 23 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Schmitt in view of Carlson (U.S. Patent 4,436,986) and Seibel et al. (U.S. Patent 3,887,788). Carlson is directed to a safety circuit for deenergizing an electric blanket. Seibel, like Watts, discloses a heating element that mounts on the rear surface of an automotive outside mirror. All of the arguments given above with regard to the nonobviousness of combining Watts and Schmitt apply with equal force and effect to the proposed combination of Schmitt and Seibel.

The Examiner has filed to explain the basis under 35 U.S.C. 103 to reject Claim 23 by combining the three references. Applicant requests reconsideration of the rejection in light of the fact that Seibel's heater conducts heat to the mirror surface, that Carlson's electric blanket heater is constructed and used in an entirely different manner than Schmitt, and that Claim 23 as currently amended patentably distinguishes from Schmitt in its recitation of a flexible fabric structure being "conformable to the shape of a contiguous flexible surface to be heated".

Claim 3 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Smuckler (U.S. Patent 5,206,482) in view of Schmitt. Smuckler discloses a self-regulating PTC heater mounted on the back side of an automotive mirror, which is quite similar in construction to Watts. All of the arguments given above against the incorrectness of combining Watts and Schmitt under 35 U.S.C. 103 apply with equal force to the combination of Smuckler and Schmitt.

Claim 11 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Smuckler in view of Schmitt and Ohmura et al. (U.S. Patent 4,032,752). All of the arguments given above against the incorrectness of combining Watts and Schmitt under 35 U.S.C. 103 apply with equal force to the combination of Smuckler and Schmitt. Ohmura is cited for its disclosure of a conductive material formulation. The Ohmura disclosure relates to a PTC ceramic honeycomb structure, which has no relationship to the conductive material recited in dependent claim 11 as it relates to the claimed self-regulating flexible heater construction of claim 1.

Reconsideration of the rejected claims and allowance of all the pending claims is respectfully requested. In the event that there are any remaining issues that can be addressed and expedited by telephone conference, the Examiner is invited to telephone the undersigned at the number indicated below.

Respectfully submitted,

Paul F. Donovan
Reg. No. 39,962

Illinois Tool Works Inc.
3600 West Lake Avenue
Glenview, Illinois 60025
Telephone (847) 657-4075